Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Using crystal optics as a guard aperture in coherent diffraction imaging experiments[1] XIANGHUI XIAO, HANFEI YAN, MARTIN DE JONGE, YUNCHENG ZHONG, YONG CHU, QUN SHEN, Advanced Photon Factory, Argonne National Laboratory — A crucial issue in coherent x-ray diffraction imaging experiments is how to increase the signal-to-noise ratio when measuring relatively weak diffraction intensities from a nonperiodic object. To achieve such a goal, a guard aperture that can block the unwanted parasitic scattering from the beam-defining aperture is necessary. The conventional guard-edge-type aperture, however, is not easy to align and may produce secondary scattering from itself. In this presentation we present a novel crystal guard aperture concept, in which a pair of multiple-bounce crystal optics is employed [Xiao et al, Opt. Lett. 31, 3194(2006)]. Different from the guard-edge-type aperture, the crystal guard aperture does not produce secondary scattering and therefore guarantee super-clean incident beam. The effectiveness of the crystal guard aperture method has been verified by the theoretical analysis and simulations based on Fresnel propagations of a dynamically diffracted Bragg wave. Recent coherent diffraction experiment results also confirmed the validity of this new guarding scheme.

[1]Use of Advanced Photon Source is supported by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under Contract No. W-31-109-ENG-38.

Xianghui Xiao
Advanced Photon Factory, Argonne National Laboratory

Date submitted: 25 Nov 2006 Electronic form version 1.4